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Alfalfa Seed Price and Seeding Rate: Impact of Production Cost

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I am often asked the question about what is the ideal alfalfa seeding rate, especially with the price of seed for most improved varieties over $4.00 per pound. Before giving the ideal seeding rate or recommended range of seeding rates, let me overview alfalfa seed size, seedling survival, and plant survival. Alfalfa has about 200,000 seeds/lb. If one pound was evenly spread over one acre (43,560 ft^2), there would be about five seeds per square foot. Therefore if you take the seeding rate you are using and multiply by five, you will come pretty close to knowing how many seeds/ft^2 that you planted.

A 15 lb/acre seeding rate (Figure 1) equates to about 75 seeds/ft^2. Research suggests that only about 50 to 70% of those seeds will become seedlings after emergence is complete in three to four weeks. Using a 60% average, that leaves about 45 seedlings/ft^2. After emergence, then "survival of the fittest" determines which seedlings become established plants. On average, as plants grow in size and compete with each other, then another 40 to 50% will die by the next spring. That leaves about 25 plants/ft^2 going into the first full year of production. During the next year, approximately 30% die leaving about 16 plants/ft^2 and continuing with some plant loss each year after that. The important thing to remember is that as plant loss occurs over the life of the stand, the surviving plants grow larger and produce more stems.

At first glance it can be discouraging that a 15 lb/acre seeding rate or 75 seeds/ft^2 only results in 25 plants/ft^2 by the beginning of the first full production season, but the important thing is that the stand is productive and is thick enough to outcompete weeds. It seems intuitive that more seeds planted on an acre or per square foot should result in more seedlings and plants per square foot. Seeding studies suggest that higher seeding rates do result in more seedlings through the end of the seeding year. However, as seeding rates increase, the percentage of plants that die during the first year also increases. Research from a recent study by Marvin Hall and others from Pennsylvania and Missouri showed a 45% first-year plant loss for a 10 lb/acre seeding rate and a 60 to 70% for seeding rates over 20 lb/acre.

The Recommended Seed Rate

A range of studies throughout the Eastern and Midwestern U.S. have shown that plant densities and yield are nearly equal for seeding rates of 10 lb/acre or more in the

year following seeding (Table 1). But remember these are generally controlled studies on good land and seeding at rates higher than the minimal amount provide insurance against problems during establishment such at variable seeding depth, uneven emergence, weed pressure, seedling diseases. Also, remember that seed coatings reduce the actual number of seeds planted per acre. Since recommended seeding rates vary with region and check with your local extension office.

Research studies provide important baselines, but it usually makes sense to increase seeding rate over the recommended level from research studies. This takes into account seed coatings that add about 20 to 30% to the weight of the seed, situations where the seedbed is less than optimum or where the desired seeding depth is difficult to obtain (either too deep or too shallow), and factors like seedling diseases and potential insect damage. Also remember that when Roundup Ready® varieties become available they have about five percent of seed that are glyphosate susceptible. Given these considerations, in Kentucky we generally recommend a seeding rate of 20 lb/acre. Top producers that are confident of their land preparation and the accuracy of their seeding equipment can usually drop that seeding rate to 15 lb/acre. Interesting though, most top producers go with the 20 lb/acre seeding rate because the extra cost of seed spread over the life of a productive alfalfa stand is minimal. See the sections and figures below for the economics of seeding rate.

Table 1. Recommended seeding rates suggested by authors of several alfalfa seeding rate studies

State	Seeding Year	Seeding Rate Range	Recommended Seeding Rate
		Lbs./acre	
SD	1985	2-30	10-14
WI	1989	6-20	12-15
PA	1991-92	6-24	9
PA + MO	1995-98	3-25	<15

(from Rankin, 2008)

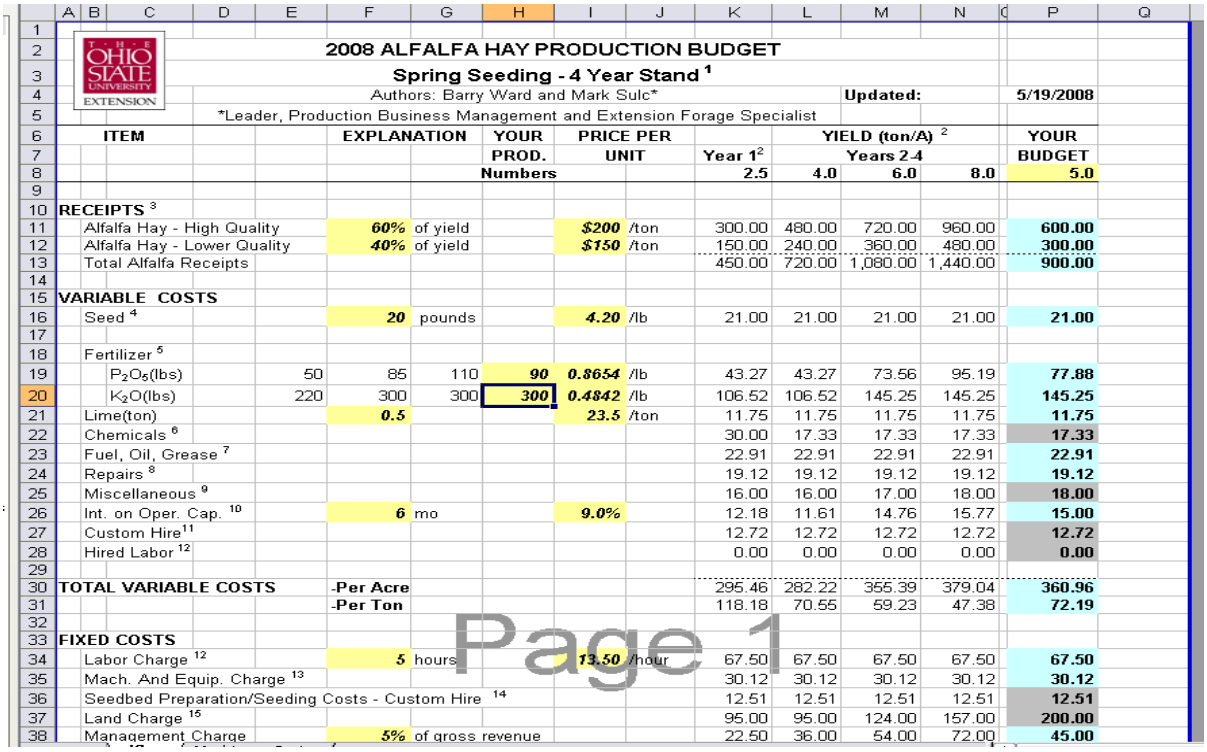
Because seeding equipment and planting conditions vary significantly, it might be well worth your time to track plant densities on your own farm. Count plants per square foot about a month after seeding, then in the fall of the seeding year, and again the next spring. At this point, you want to have at least 15 - 25 plants/ft^2 to achieve maximum yields. Even if plant counts are a bit lower, plants will likely compensate with more stems per plant. Excellent yields can still be attainable as long as weed pressure is minimized by spraying, clipping, or simply by maintaining a vigorous stand.

How Much Money Can I Save By Reducing Seeding Rates?

The important thing to remember is that seed costs, spread over the life of a stand, compromise only a small percentage of a total alfalfa production budget. I encourage you to do your own calculations regarding the cost of seed and the small difference it makes in the overall cost of a stand. There are a number of good alfalfa production budgets available from University Extension Specialists in the U.S. These budgets are typically excel spreadsheets so it is easy to enter your own production information. I have listed the names and websites of the budgets from The Ohio State and The University of Kentucky below.

Figures 1-3 show examples of the Ohio budget using seeding rates of 10, 15, and 20 lb/acre calculated with a $4.20/lb seed cost, a stand producing 5 tons/acre per year, and a four year stand life. Using this budget a 20 lb/acre rate costs $360.96/acre/year, 15 lb/acre costs $355.47/acre/year, and 10 lb/acre costs $349.99/acre/year. Therefore, saving a few dollars by lowering seeding rate from 20 lb/acre down to 10 lb/acre would save a grand total of $10.93/acre/year. Another way of looking at it is that going with the recommended 20 lb/acre only costs $2.19 per ton of hay over a 10 lb/acre seeding rate.

Figure 1. Alfalfa production cost with 20 lb/acre seeding rate The Ohio State alfalfa budget.



2008 ALFALFA HAY PRODUCTION BUDGET

Spring Seeding - 4 Year Stand [1]

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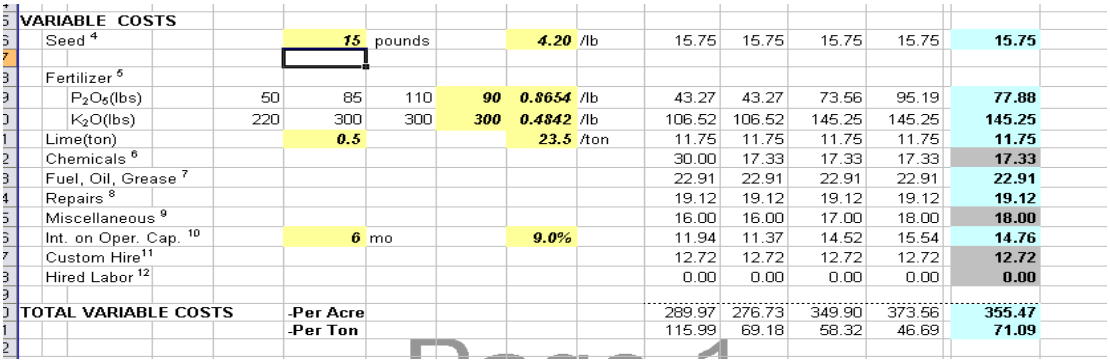
*Leader, Production Business Management and Extension Forage Specialist

Updated: 5/19/2008

ITEM		EXPLANATION			YOUR PROD.	PRICE PER UNIT		YIELD (ton/A) [2] Year 1	Years 2-4			YOUR BUDGET
					Numbers			2.5	4.0	6.0	8.0	5.0
RECEIPTS [3]												
Alfalfa Hay - High Quality		60%	of yield			$200	/ton	300.00	480.00	720.00	960.00	600.00
Alfalfa Hay - Lower Quality		40%	of yield			$150	/ton	150.00	240.00	360.00	480.00	300.00
Total Alfalfa Receipts								450.00	720.00	1,080.00	1,440.00	900.00
VARIABLE COSTS												
Seed [4]		20	pounds			4.20	/lb	21.00	21.00	21.00	21.00	21.00
Fertilizer [5]												
	P_2O_5(lbs)	50	85	110	90	0.8654	/lb	43.27	43.27	73.56	95.19	77.88
	K_2O(lbs)	220	300	300	300	0.4842	/lb	106.52	106.52	145.25	145.25	145.25
Lime(ton)		0.5				23.5	/ton	11.75	11.75	11.75	11.75	11.75
Chemicals [6]								30.00	17.33	17.33	17.33	17.33
Fuel, Oil, Grease [7]								22.91	22.91	22.91	22.91	22.91
Repairs [8]								19.12	19.12	19.12	19.12	19.12
Miscellaneous [9]								16.00	16.00	17.00	18.00	18.00
Int. on Oper. Cap. [10]		6	mo			9.0%		12.18	11.61	14.76	15.77	15.00
Custom Hire [11]								12.72	12.72	12.72	12.72	12.72
Hired Labor [12]								0.00	0.00	0.00	0.00	0.00
TOTAL VARIABLE COSTS		-Per Acre						295.46	282.22	355.39	379.04	360.96
		-Per Ton						118.18	70.55	59.23	47.38	72.19
FIXED COSTS												
Labor Charge [12]		5	hours			13.50	/hour	67.50	67.50	67.50	67.50	67.50
Mach. And Equip. Charge [13]								30.12	30.12	30.12	30.12	30.12
Seedbed Preparation/Seeding Costs - Custom Hire [14]								12.51	12.51	12.51	12.51	12.51
Land Charge [15]								95.00	95.00	124.00	157.00	200.00
Management Charge		5%	of gross revenue					22.50	36.00	54.00	72.00	45.00

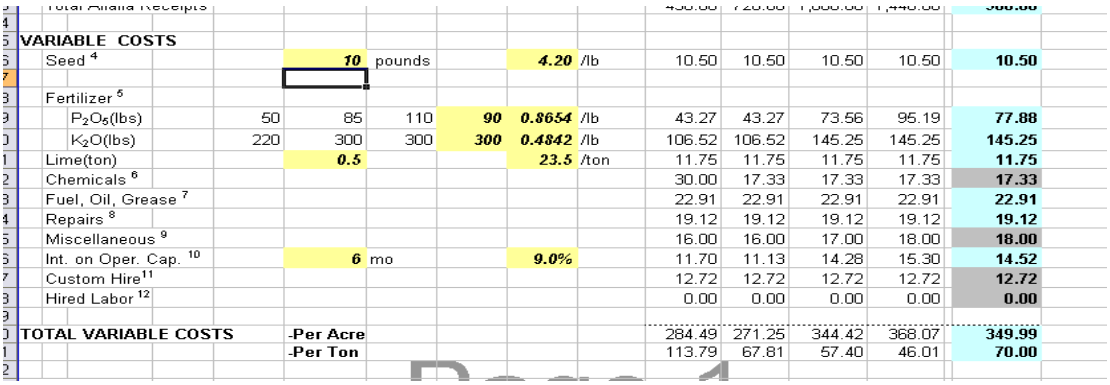
Page 1

Figure 2. Alfalfa production cost with 15 lb/acre seeding rate.



VARIABLE COSTS												
Seed [4]			15	pounds		4.20	/lb	15.75	15.75	15.75	15.75	15.75
Fertilizer [5]												
P_2O_5(lbs)	50	85	110	90	0.8654	/lb		43.27	43.27	73.56	95.19	77.88
K_2O(lbs)	220	300	300	300	0.4842	/lb		106.52	106.52	145.25	145.25	145.25
Lime(ton)		0.5			23.5	/ton		11.75	11.75	11.75	11.75	11.75
Chemicals [6]								30.00	17.33	17.33	17.33	17.33
Fuel, Oil, Grease [7]								22.91	22.91	22.91	22.91	22.91
Repairs [8]								19.12	19.12	19.12	19.12	19.12
Miscellaneous [9]								16.00	16.00	17.00	18.00	18.00
Int. on Oper. Cap. [10]		6	mo		9.0%			11.94	11.37	14.52	15.54	14.76
Custom Hire [11]								12.72	12.72	12.72	12.72	12.72
Hired Labor [12]								0.00	0.00	0.00	0.00	0.00
TOTAL VARIABLE COSTS		-Per Acre						289.97	276.73	349.90	373.56	355.47
		-Per Ton						115.99	69.18	58.32	46.69	71.09

Figure 3. Alfalfa production cost with 10 lb/acre seeding rate.



VARIABLE COSTS												
Seed [4]			10	pounds		4.20	/lb	10.50	10.50	10.50	10.50	10.50
Fertilizer [5]												
P_2O_5(lbs)	50	85	110	90	0.8654	/lb		43.27	43.27	73.56	95.19	77.88
K_2O(lbs)	220	300	300	300	0.4842	/lb		106.52	106.52	145.25	145.25	145.25
Lime(ton)		0.5			23.5	/ton		11.75	11.75	11.75	11.75	11.75
Chemicals [6]								30.00	17.33	17.33	17.33	17.33
Fuel, Oil, Grease [7]								22.91	22.91	22.91	22.91	22.91
Repairs [8]								19.12	19.12	19.12	19.12	19.12
Miscellaneous [9]								16.00	16.00	17.00	18.00	18.00
Int. on Oper. Cap. [10]		6	mo		9.0%			11.70	11.13	14.28	15.30	14.52
Custom Hire [11]								12.72	12.72	12.72	12.72	12.72
Hired Labor [12]								0.00	0.00	0.00	0.00	0.00
TOTAL VARIABLE COSTS		-Per Acre						284.49	271.25	344.42	368.07	349.99
		-Per Ton						113.79	67.81	57.40	46.01	70.00

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